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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/557,108	04/24/2000	Jiang Hsieh	15-CT-5344	8980

7590 11/26/2003

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EXAMINER
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KIM, CHONG R

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 11/26/2003

10

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/557,108

Applicant(s)

HSIEH, JIANG

Examiner

Charles Kim

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9, 11-13, 15-21, 23 and 25-27 is/are rejected.
- 7) ☒ Claim(s) 8, 10, 14, 22, 24 and 28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 29, 2003 has been entered.

***Response to Amendment and Arguments***

2. Applicant's amendment filed on July 29, 2003 has been entered and made of record.

3. In view of applicant's amendment and the issuance of U.S. Patent Application No. 09/429,867 (now U.S. Patent No. 6,597,803), the provisional obviousness-type double patenting rejection is withdrawn.

4. Applicant's arguments have been fully considered, but they are not deemed to be persuasive for at least the following reasons.

The Examiner notes that the applicant's arguments (pages 15-18) in regard to claims 1-5, 9, 11, 15-19, 23 and 25 are addressed in the rejections below.

The Examiner further notes that the applicant's arguments (pages 18-22) in regards to claims 6-7, 12-13, 20-21, 26-27 have already been addressed on pages 3-4 of the previous office action dated May 29, 2003.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-5, 9, 11, 15-19, 23, 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Taguchi (U.S. Patent No. 5,974,108).

Referring to claim 1, Taguchi discloses a method for imaging an object with a computed tomographic imaging system, comprising the steps of:

a. helically scanning the object with a multi-slice CT imaging system to acquire attenuation measurements of the object, the measurements including more than two conjugate samples (col. 4, line 61 to col. 5, line 9. Note that the “groups of real data” in col. 5, line 6 is interpreted as being analogous to more than two conjugate samples; since two data samples are selected from the group, see col. 5, lines 4-6. See also col. 11, lines 48-49), wherein a difference between a view angle of one of the more than two conjugate samples and a view angle of any one of the remaining conjugate samples of the more than two conjugate samples is  $n\Pi$ , wherein  $n$  is an integer greater than zero (col. 10, lines 63-67)

b. estimating a projection at a plane of reconstruction of the object using the attenuation measurements of the object, including the more than two conjugate samples [col. 11, lines 48-60 and figure 15. Taguchi explains that the interpolated data is determined using more

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than two ( $2n+1$ ) samples, wherein the interpolated data is supplied to the image reconstructor in order to reconstruct (project) the image (col. 12, lines 22-25)]

c. filtering and backprojecting the attenuation measurements of the object, including the more than two conjugate samples, to reconstruct at least one image slice of the object [col. 25, lines 1-12 and col. 26, lines 19-21. Note that the filtering is performed in the interpolator (29) and the backprojecting is performed in the image reconstructor (31) of figure 11].

Referring to claim 2, Taguchi further discloses that the more than two conjugate samples are located within a predetermined distance from the plane of reconstruction of the object [col. 2, lines 23-29. Note that the "target slicing location" in line 27 is interpreted to mean the plane of reconstruction, since the image is produced at that location, col. 6, lines 28-30. It is also noted that the samples (arrows) are located within a predetermined distance from the plane of reconstruction (target slicing location) in figure 4B].

Referring to claim 3, Taguchi further discloses that the CT imaging system has N detector rows (col. 14, line 66), and further comprises the step of selecting a helical pitch  $P:1$  for the helical scan, where P is a non-integer less than N (col. 15, line 33. Note that  $N=4$  and a helical pitch of 2.5 is selected).

Referring to claim 4, Taguchi further discloses that  $N=4$  and  $P=2.5$  (col. 14, line 66 and col. 15, line 33 and figure 26).

Referring to claim 5, Taguchi further discloses a step of applying a non-linear interpolation to the attenuation measurements prior to the filtering and backprojecting (col. 24, lines 34-45 and figure 45).

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Referring to claim 9, Taguchi further discloses that applying a non-linear interpolation to the attenuation measurements comprises combining weighted interpolated measurements with weighted extrapolated measurements (col. 11, lines 20-28 and col. 12, lines 12-20).

Referring to claim 11, Taguchi further discloses the step of applying a set of weights to the attenuation measurements prior to the filtering and backprojecting (col. 10, lines 45-57. Note that the weights are applied as the interpolation proceeds in lines 45-46, and is therefore applied prior to the filtering and backprojecting; since the interpolation is applied prior to the filtering and backprojecting as disclosed above).

Claims 15-19, 23, 25 recite a system that corresponds to the method of claims 1-5, 9, 11. Arguments analogous to those presented above with respect to claims 1-5, 9, 11 are applicable to claims 15-19, 23, 25. The system for performing Taguchi's method is inherent in his teaching.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6-7, 12-13, 20-21, 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi (U.S. Patent No. 5,974,108), further in view of Berlad (U.S. Patent No. 5,513,120).

Referring to claim 6, Taguchi fails to teach applying a Lagrange interpolation.

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Berlad teaches a step of applying a Lagrange interpolation to a radiation image (col. 4, lines 1-19).

Taguchi and Berlad are both concerned with reconstructing radiation images by applying interpolation and backprojection. Berlad's method provides an interpolated image where the texture of the image does not vary as a function of location and the signal content and signal-to-noise ratio are substantially the same after the interpolation (Berlad, col. 2, lines 16-29). Berlad further explains that the non-linear Lagrange interpolation technique minimizes texture artifacts, thereby producing an accurate interpolated image (Berlad, col. 4, lines 25-44). The ordinary artisan would have been motivated to combine the teachings of Taguchi and Berlad in order to reconstruct a radiation image based on an accurate interpolated image, thereby enhancing the resultant radiation image and improving diagnosis. Therefore, it would have been obvious to modify the interpolation of Taguchi so that it is a Lagrange interpolation, as taught by Berlad.

Referring to claim 7, Berlad further teaches the step of applying third order Lagrange interpolation weights to a radiation image (col. 4, lines 48-50. Note that the "four interpolation coefficients as derived from a four point cubic Lagrange polynomial" in lines 48-50 is interpreted to mean third order Lagrange interpolation weights).

Taguchi teaches applying a non-linear interpolation to the attenuation measurements from four detector rows (col. 14, line 66 and col. 24, lines 34-45). Therefore, the combination of Taguchi and Berlad teach applying a third order Lagrange interpolation weights to measurements from four detectors.

Referring to claim 12, Taguchi fails to teach the step of applying Lagrange weights to the attenuation measurements.

Berlad teaches the step of applying Lagrange weights to a radiation image (col. 48-50. Note that the “four interpolation coefficients” in line 48 is interpreted to mean Lagrange weights).

Taguchi and Berlad are both concerned with reconstructing radiation images by applying interpolation and backprojection. Berlad’s method provides an interpolated image where the texture of the image does not vary as a function of location and the signal content and signal-to-noise ratio are substantially the same after the interpolation (Berlad, col. 2, lines 16-29). Berlad further explains that the non-linear Lagrange interpolation technique minimizes texture artifacts, thereby producing an accurate interpolated image (Berlad, col. 4, lines 25-44). The ordinary artisan would have been motivated to combine the teachings of Taguchi and Berlad in order to reconstruct a radiation image based on an accurate interpolated image, thereby enhancing the resultant radiation image and improving diagnosis. Therefore, it would have been obvious to modify the set of weights of Taguchi, so that they are Lagrange weights, as taught by Berlad.

Referring to claim 13, see the rejection of at least claim 7 above.

Claims 20-21, 26-27 recite a system that corresponds to the method of claims 6-7, 12-13. Arguments analogous to those presented above with respect to claims 6-7, 12-13 are applicable to claims 20-21, 26-27. The system for performing Taguchi and Berlad’s method is inherent in their teaching.



*Allowable Subject Matter*

7. Claims 8, 10, 14, 22, 24, and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 703-306-4038. The examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30am to 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

ck

November 17, 2003

  
Jon Chang  
Primary Examiner